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Transport Performance in North Vietnam

3 November 1967

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Transport Performance in North Vietnam

Introduction

Air strikes against the transportation system of North Vietnam during the past two and a half years have disrupted operations and created substantial losses of transport equipment and facilities. The problems in maintaining traffic movements have multiplied, but as a result of countermeasures, the use of alternate routes, and foreign assistance, North Vietnam's logistic capabilities have not been reduced. In fact there is probably more surplus capacity available today than existed at the start of the Rolling Thunder program. The Chinese Communists have aided in converting much of the railroad plant to dual guage, new roads have been built, and the inland waterways have been improved. (See map, Figure 1) The Chinese and other Communist countries have made available sufficient transport equipment and other materials to compensate generally for the losses sustained from air attacks. In addition, primitive transport has been organized to a greater extent than previously to replace modern transport for some short haul traffic and to assist in transshipping traffic around interdictions in the modern network.

Performance

1. Total ton-kilometer performance by modern transport is estimated to have declined each year of the air strikes, but during the first half of 1967 tons carried declined for the first time. (See Table 1) The 1963 and 1964 data are based on North Vietnamese announcements and the remaining data are CIA estimates.

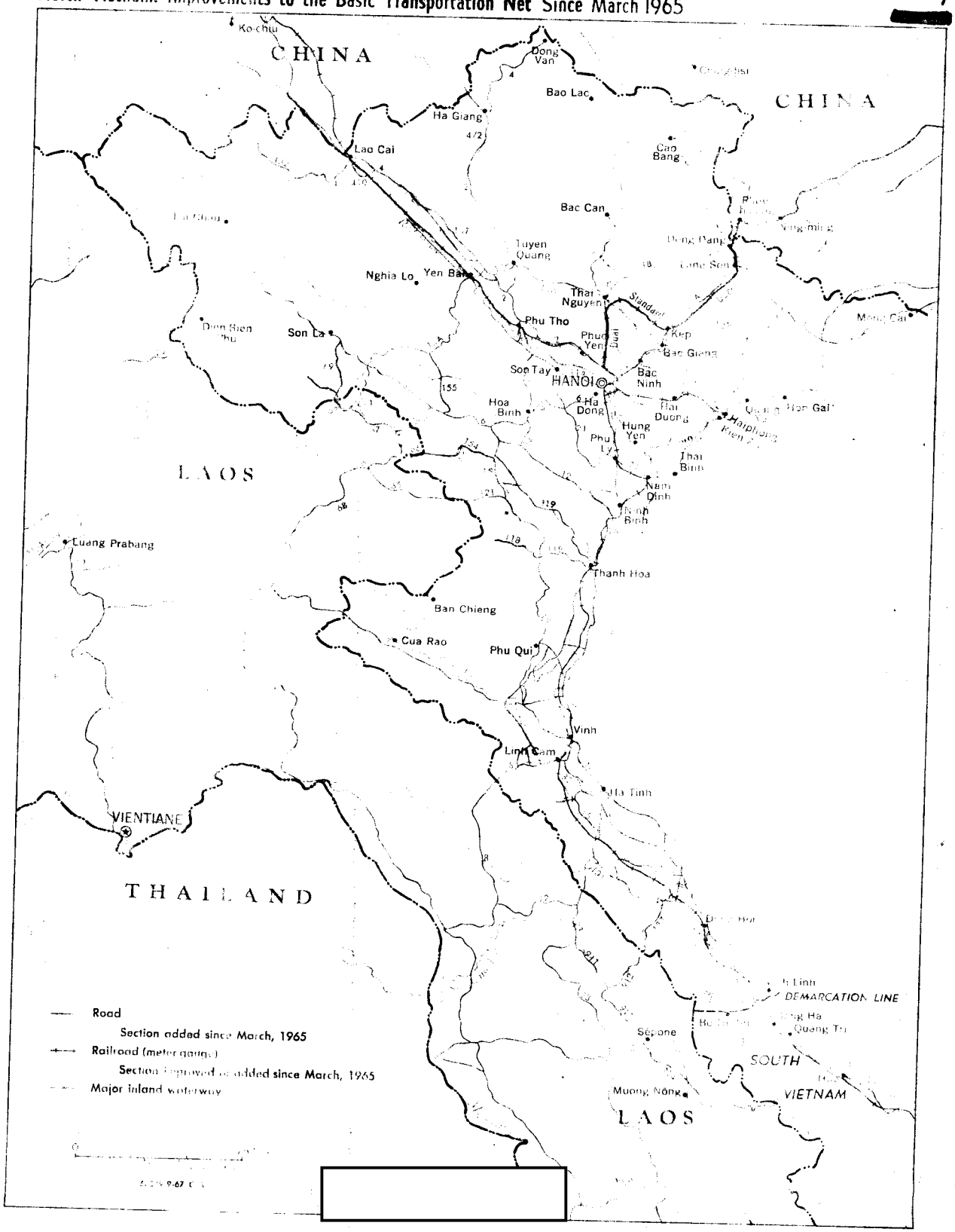
Table 1

North Vietnam: Transport Performance
1963-66 and January-June 1967

Million Ton-Kilometers

	1963	1964	1965	1966	First Six Months 1967
Railroad	847	927	770	620	303
Highway	164	179	200	200	100
Inland Water	448	490	540	590	295
Coastal Water	142	156	170	190	80
Total	1601	1752	1700 a/	1600	710

North Vietnam: Improvements to the Basic Transportation Net Since March 1965



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	1963	1964	1965	1966	Million Tons Carried First Six Months 1967
Railroad	3.86	4.13	3.7	3.3	1.6
Highway	6.71	7.18	7.9	7.9	3.9
Inland Water	6.56	7.01	7.7	8.5	3.2
Coastal Water	0.35	0.37	0.4	0.5	0.2
Total	17.48	18.69	19.7	20.2	8.9

a. Total does not add because of rounding.

2. The decline in performance in 1967 is the result of the fall off in demand for transport attributable to the attacks on power-plants and modern industrial plants during the early months of 1967. The decline is not the result of interdictions in the transport systems because the capacity of nearly all transport routes continues to be greater than the volume of traffic moving on the routes.

3. The cessation of output in modern industry eliminated the need to ship coal and other raw materials for the plants, and the output of these plants no longer had to be moved. In addition, there was a 200,000-ton shortfall in the 1967 spring rice crop which also reduced requirements for transport. In total, the decrease in agricultural and industrial production by the end of June 1967 amounted to about 8,700 tons a day. The decline in transport requirement is estimated at about 1.5 million tons carried during the first half of the year.

4. This decline was partially offset by the increase in the volume of foreign trade moved through Haiphong. This volume increased by about 1,300 tons a day over the 1966 level, and resulted in a total increase of an estimated 300,000 tons carried by the North Vietnamese transport system during the six months of 1967. Thus the net decline in tons carried was about 1.2 million ton. It is expected that the tonnage of goods moved will further decline in the last half of the year unless some of the industrial plants resume production or imports increase sharply during the final quarter.

5. Nearly all of the decline in transport performance during 1967 occurred in water transport, while rail and truck performance

continued at ab ut the 1960 level. Most of the coal and other bulk raw materials no longer required had been moved by water transport and, to a small extent, by rail transport. These goods were moved mainly in the Haiphong area or through Haiphong to Hanoi and other industrial centers. Thus this reduction has released the water capacity, particularly barges and other watercraft, to handle the movement of the larger volume of imports from Haiphong.

Rail [illegible]

6. Performance on the rail lines has decreased from the high in [illegible], and the relative importance of the various lines has changed considerably as a result of the US air war. The reduction in performance is attributed for the most part to the loss of transit exports normally carried by rail to Haiphong and to the ending of rail traffic through North Vietnam.* This traffic was carried mainly on the Lao Cai line, which now carries only a small share of its former traffic.

7. Table 2 and the graphic, Figure 2 show the estimated average tons carried per day on each rail line during the first six months of 1967. These estimates show the relative importance of each rail line. They are based on railroad car counts from photography with adjustment for the estimated volume of import traffic.**

Table 2

North Vietnam Average Tons Carried Per Day by Railroad Line, January-June 1967

	Metric Tons Per Day	Percent of Total
Hanoi - Haiphong Line	4,000	45
Lines to Thai Nguyen	1,500	17
Hanoi - Lang Dang Line	1,300	15
Hanoi - Vinh Line	1,300	15
Hanoi - Lao Cai	700	8
Total	8,800	100

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** Cars located in the Hanoi area were allocated to the several lines in accordance with the volume of import traffic estimated to be moving on the Hanoi-Lang Dang and the Hanoi-Haiphong lines.

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Figure 2. Estimated Traffic Carried on North Vietnamese Railroads, in Metric Tons per Day
January-June 1967

8. The Hanoi-Haiphong line carries a greater share of the total tonnage moved by rail than it did in 1964 because of the significant increase that has occurred in the volume of imports arriving at Haiphong. The Dong Dang line, which formerly also carried Chinese transit traffic has been carrying a greater volume of import traffic. During the first half of 1967 import traffic on this line averaged about 1,150 tons per day, but without the need to import bituminous coal to produce pig iron at Thai Nguyen, traffic on this line will be considerably reduced in the second half of 1967 unless imports of other goods increases. The Thai Nguyen lines, one of which has been built since the air attacks began, have gained importance as an alternate route to Hanoi from Kep. The rail line to Vinh, although heavily bombed and interdicted for through traffic, appears to be carrying a larger volume than in 1964 as more goods are moved south to support the war.

Other Modes

9. Very little information is available on the volume of traffic moved on individual highway, inland water, and coastal water routes. An area analysis indicates that the major portion of the traffic moved by these modes moves in the densely populated areas and centers of industrial and agricultural production. These areas are located in the Red River Delta and the coastal plains which together account for about one-third of the land area of North Vietnam and 90 percent of the population. The provinces south of Hanoi contain more than 60 percent of the population, but have relatively little railroad service. Highland areas and outlying areas near the borders have relatively few rail or inland water routes. The southern two provinces, for example, have about 6 percent of the total population, but no mainline rail service and only minor inland water routes. Thus inland water transport is used heavily in the delta area near Hanoi, but further south and west truck transport is the predominate form of transport. Coastal water transport supplements these forms of transport in coastal areas.

Highway

10. Although highway transport continues to serve mainly as short-haul feeder service to the railroads, trucks are being used increasingly to handle traffic problems resulting from rail interdiction and to keep supplies moving to the military forces in the outlying areas. The heaviest movement of traffic, however, continues to be centered around the two main cities of Hanoi and

Haiphong and other population centers in the Delta. The highest quality and probably the most heavily used road in the country is Route 5 between Hanoi and Haiphong, followed by Route 1A extending north and south of Hanoi. (See the map, Figure 3)

11. Roads in the northern part of the country that are important for military traffic are routes 3, 4, and 1B. Other routes particularly important for military transport are routes in Laos that have been developed as a major means of support for Communist forces in Laos and South Vietnam. Roadwatch teams on Route 6 in Sam Neua Provinces, Laos, have reported truck traffic moving into Laos at a rate that, if all the trucks carried cargo, could have delivered about 13,000 tons after losses* in the year ending 30 September 1967. Likewise traffic on Route 7 into the Plaine de Jarres could have delivered about 27,000 tons in the same period. Truck transport battalions also carried military supplies into the northern part of Laos on Routes 19 and 65, but the traffic count was so incomplete that a quantity estimate cannot be derived for these routes.

12. Communist truck traffic on Route 15 through Mu Gia Pass into the Laotian Panhandle is estimated to have delivered nearly 15,000 tons during the year ending 30 September 1967. No traffic count has been available for Route 137, an alternate to the Mu Gia route constructed since bombing began, but assuming that this route was used to the same proportion of its capacity as Route 15 was used to its capacity, about 9,000 tons could have been delivered. In addition it is estimated that about 3,000 tons were delivered mainly by truck to the beginning of the trail systems into Laos. Thus transport routes in the North Vietnamese Panhandle carried a total of about 27,000 tons in the past year to be moved forward on Route 7 and a similar amount for the delivery into the Panhandle of Laos. Additional tonnage was moved south into the three southern provinces of South Vietnam. All modes of modern transport were probably used to move this tonnage south from the Thanh Hoa area; but in the area south of Vinh truck transport probably was used predominantly, principally via Routes 1A and 15.

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* The shipping tonnage given in this section are estimated by assuming that the daily average number of trucks observed moving into Laos on days that the road was observed was applicable to days of no observation. It is further assumed that each truck carried 3 tons of cargo. An arbitrary factor of 20 percent is deducted for normal losses in transit and losses due to air attacks.

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Figure 7

Inland waterways

13. The major inland water routes are the Cua Cam, the Song Thai Binh, the Red River upstream from the Nam Dinh area, and the coastal canals that link these natural waterways. Between Nam Dinh and the Chinese border the major transport route is the Song Thai Binh Canal, roughly parallel to the Red River. No information is available to determine the amount of traffic moved on any one of these routes. However, the major traffic flow on the inland waterways undoubtedly is the coal that moves inland from the coast mostly through the port of Haiphong. There are two principal and numerous minor water routes connecting Haiphong with Hanoi. The southern route via the Canal des Bambous and the Red River has the largest capacity and is the most heavily used. The northern route via the Song Thai Binh and Canal des Rapides. The relative importance of these routes is indicated by a count of the craft in the two waterways in two days in June and July 1967. The average number of craft sighted in the northern route on the two days had an estimated carrying capacity of 17,[illegible] tons, while those in the northern route had 5,000 tons. All of this capacity was not engaged, however, in hauling traffic between Haiphong and Hanoi. Some craft were inactive, some were empty, and some were serving intermediate points.

Coastal Water

14. Coastal water transport in North Vietnam consists mostly of comparatively long-haul traffic. The average length of haul in 1964 was about 450 kilometers. Pilot observations of water craft operating along the coast indicates that barges, coastal freighters, junks, and other small craft continue to operate to southern ports, mainly Nam Hong, Ben Thuy, Quang Khe, and Dong Hoi. The northern terminus of much of this traffic probably is Haiphong and adjacent areas.

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Civilian Supply Requirements in Route Packages I, II, and III
(North Vietnam)

3 November 1967

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Civilian Supply Requirements in Route Packages I, II, and III (North Vietnam)

SUMMARY

The 2.5 million civilians located in Route Packages I, II, and III have a requirement for goods that must be brought in from outside — either imports or goods produced in the north — on the order of [illegible] to 100 metric tons per day. The largest item in this requirement is POL — about 40 metric tons per day. The population is largely rural and, despite the disruption of the bombing, probably is nearly self-sufficient in terms of food.

Population

1. Of North Vietnam's total population of 18.5 million (mid-1967), about 2.5 million (13.5 percent) are located in the areas of Route Packages (RP) I, II, and III. This population is largely concentrated in the narrow coastal strip which extends from the heavily populated Red River Delta region to the DMZ. All coastal areas are [illegible] and population density varies between 10 and 200 per square [illegible]. The highest population densities are found in the areas of the small cities of Vinh and Dong Hoi and the area surrounding Mui Ron. [illegible] densities are low compared to the Red River Delta.

Agriculture

2. Although living standards are low, the rural areas of North Vietnam are very nearly self-sufficient. The southern coastal strip included in RP's I, II, and III exchanges few products with the other areas of the country, but probably had a small net surplus of foodstuffs — primarily fish and [illegible] — before the bombing and received a small quantity of manufactured goods. Because the bombing has been concentrated in the southern RP's, fishing and agricultural pursuits have been more seriously disrupted there than in areas to the north. As a result, little or no food is shipped out of the area at the present time.

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External Requirements

3. The external requirement of the civilian population of MR's I, II, and III is probably between 80 and 100 tons per day. These requirements consist primarily of POL and small quantities of other imported supplies such as agricultural tools and equipment, and textiles, clothing, and medicine. Of the total POL requirement of about 11 thousand tons per day for the three route packages, only about 40 tons is consumed in the civilian economy. Little if any food is shipped into the area for civilian consumption. The sharp increase in food imports into North Vietnam during 1966 has probably been used to feed the military population and military forces.

4. Because of the severity of the bombing in this area, some previous requirements are being forgone. For example, the 2,000 tons per day of coal formerly consumed by the Ben Thuy Thermal Power Plant at Vinh is no longer required and it is assumed that most of the greater quantity of fertilizer previously imported is being shipped into the country at present because of the importance of shipping higher priority goods.

5-2501

Costs of the Bombing to North Vietnam

Diversion of Manpower

1. The North Vietnamese labor force before the bombing began in 1965 was largely unskilled, underemployed, and, at least in agriculture, seasonally unemployed. Agriculture employed 70 percent of the civilian labor force of about 9.6 million and was particularly labor intensive. This highly underemployed work force forms a reservoir from which manpower has been taken for other purposes with only slight adverse effects on agricultural output. Handicraft industries accounted for about a third of the total output of North Vietnamese industry, and employed about 600,000 workers. This work force has formed another pool from which labor has been diverted with only slight adverse effects on the economy.

2. Airstrikes have required the services of about 600,000 workers for the repair of lines of communication, reconstruction of buildings and bridges, civil defense, antiaircraft defense and coastal defense. This labor force is composed of males and females, young and old, civilian and military. About 100,000 of the 600,000 workers are military personnel. The labor force is divided about equally between full-time and part-time workers. Of the estimated 300,000 full-time workers, about a third are working on transportation, slightly less than a third on air defense, about one-fourth on repair of lines of communication and reconstruction, and about 10 percent in coastal defense. The bulk of these probably have come from the agricultural labor force. The part-time force is used primarily as needed on a voluntary basis in the areas where airstrikes create an additional labor requirement. At any one time, about half of the part-time force is engaged in civil defense, about a third in repair of lines of communication, and less than 10 percent each in transport and air defense. The particular tasks performed by this part-time force vary as the requirements change. Because the greatest need for civil defense workers is in urban areas, the bulk of these workers are believed to be non-agricultural workers coming primarily from the service occupations.

3. Industries that have been paralyzed by direct bomb damage and/or outage of electric power were primarily modern facilities using complex machinery and modern production techniques. It is estimated that by mid-1967 about 30,000 workers in modern industry had been put out of work by the direct or indirect results of the bombing. Although the workers freed represent only about 4 percent of the industrial labor force, they have a higher technical competence, skills and

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industrial discipline relative to the total labor force. They undoubtedly play a significant role in the maintenance of production by dispersed industries, and in the repair of damage facilities.

4. The main effect of the diversion of manpower on living standards has been the increased work load that the labor force is now carrying. The average North Vietnamese is now expending more energy than he did before the bombing. The diversion of manpower has had only a relatively minor effect on industrial output. The major harm to industrial output has occurred from direct bomb damage and the lower productivity of the dispersed factories. The diversion of manpower from agriculture probably contributed slightly to the estimated decline in output that in 1966 was the equivalent of 200,000 tons of polished rice. In agriculture, however, it is not possible to determine clearly those effects attributable to manpower diversion as compared to those due to adverse weather.

5. North Vietnam's manpower resources appear adequate to operate the economy at a subsistence level, and continue simultaneously to support the war in South Vietnam and to maintain its defenses at current or even increased levels. There are approximately 120,000 males working in trade outside the state sector; about 175,000 in consumer services such as barbers, garbage collectors, waiters, publishing personnel and the like; about 60,000 male students above the age of 15 studying in North Vietnam and about 5,000 studying abroad; and about 40,000 males in teaching. Therefore, about 380,000 males of working age and demonstrably capable of some economic activity are available for military-related work if labor becomes scarce. In addition, there are about an equal number of women in these occupations. Excessive diversions from these groups for war-supporting tasks would undoubtedly result in a decline in living standards and, in the case of students, would be counter-productive in the long run, but might be considered justifiable under the circumstances.

6. After more than two and a half years of bombing the North Vietnamese are much more experienced at countermeasures, and as long as morale remains high and imports of necessary material continue, North Vietnam is not expected to be faced with a critical shortage of labor. Unless losses in the South increase substantially, the military force can be maintained by drawing from the estimated 190,000 males that reach the draft age of 17 each year. Of these about 120,000 probably would be physically fit and if military requirements were increased lower physical standards could yield additional increments of military age males.

Destruction of Industry

7. Industry accounted for about a quarter of North Vietnam's GNP before the bombing. Almost half of industrial output came from the modern, large-scale industrial facilities that have been to a large degree rendered inoperative either by direct bomb damage, shortage of electric power, or by dispersal. The other half of industrial output comes from thousands of small-scale, local factories or handicraft shops. At present, the amount of industrial output lost as a result of the bombing is estimated at less than 10 percent of GNP.

8. The effect of the bombing of industry on standards of living probably has been minimal. The inoperative plants were primarily producers of heavy industrial goods, such as pig iron, cement, and chemicals, and made little immediate contribution to the simple needs of the North Vietnamese consumer. The one manufactured good in short supply is textiles but the shortage does not appear intolerable and can be relieved with increased imports. The curtailment of residential construction can be expected to cause a housing problem, particularly in the areas supporting evacuees from the cities. At present, however, housing does not appear to be a serious problem. Through exhortations to work harder and through increased foreign aid, the regime has been able to maintain the levels of most consumer rations. The people are by necessity consuming greater proportions of less palatable foods such as manioc, sweet potatoes and imported wheat flour and maize, but the total caloric value of the diet appears adequate.

9. The bombing has caused a decline in foreign exchange earnings as the volume of North Vietnam's exports has dropped precipitously. In August, for instance, identified seaborne exports amounted to only 20,500 metric tons compared with an average monthly volume of almost 100,000 metric tons during 1966. Since May no exports of pig iron, cement or apatite have been observed and exports of coal are well below normal levels. Although reduced exports of these bulk commodities resulted in a sharp decline in export volume, the actual decline in value has been more modest. Over half of the value of North Vietnam's exports comes from products of agriculture, forestry and handicraft and the export of these relatively high-value items has not been appreciably affected by the bombing.

10. Known export losses as a result of the bombing have averaged less than $2 million a month thus far in 1967, or less than 25 percent of North Vietnam's average monthly exports for 1965. Although the

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exports curtailed by the bombing were those involved in trade with Free World countries and thus the main earners of foreign exchange, the loss is small compared to the amount of economic aid being supplied by Communist countries. North Vietnam's normal exports to Free World nations amounted to less than $25 million a year. The loss of these export earnings should present no economic problems since Communist countries appear willing and able to furnish North Vietnam any goods formerly purchased from non-Communist countries.

11. North Vietnam is compensating for the destruction to industrial capacity largely by increased imports. Imports increased from about $130 million in 1964 to $195 million in 1965 and to about $240 million in 1966. Imports in 1967 are running at an even higher rate than in 1966. Increased imports of textiles, chemicals, fertilizers and foodstuffs apparently will compensate for the decline in domestic production that has resulted largely from the bombing. A large part of the increased imports, however, consists of POL, vehicles, machinery, steel sheet and plate, metal tubes, bars, and wire which are being imported to satisfy increased needs related to the war, i.e., the repair of damaged lines of communication, the maintenance of transport equipment inventories, and the construction of defense facilities.

12. North Vietnam has switched the emphasis of industrial development from large-scale centrally-controlled industries to small-scale, local industry. In addition, a few of the existing large industrial facilities have been partly dispersed. Included among these is the Nam Dinh Textile Plant, which before it was bombed in mid-1965 produced almost all of North Vietnam's cotton yarn and had the capacity to produce about 50 million meters of cloth annually. Output of the dispersed shops of the plant is unknown but is believed to be well below the plant's pre-bombing output. The 8 March Textile Plant, having an annual capacity of 30 million meters of cotton cloth, 80,000 meters of other cloth, and about five million jute bags was at least partly dispersed although it has never been bombed. In addition, the Haiphong Phosphate Plant which produced about 7 percent of the nation's chemical fertilizer has been relocated. A number of minor machine building and repair shops also have been relocated to rural areas.

13. At present the regime is attempting little in the way of restoring and reconstructing damaged industrial facilities and little work is currently being done on partially finished aid projects. The Lang Chi Hydroelectric Plant apparently has not been worked on since

June 1966. The plan to add a steel-making component to the Thai Nguyen Iron and Steel Combine has apparently been postponed. The cost of restoring the damage to the major manufacturing facilities is estimated to be only about $15 million. The cost of repairing electric power plants is estimated at $25 million. The time required to restore these facilities to pre-war capacities, assuming complete availability of machinery and of sufficient numbers of technicians would be up to two years. The reason for the current deferment of such restoration undoubtedly is the realization that such restoration would only invite further bombing.

14. Only eight of 242 JCS targets are industrial facilities. Of these eight, five have been damaged by bombing -- the Lang Chi Explosives Plant, the Thai Nguyen Iron and Steel Combine, the Haiphong Cement Plant, the Phu Tho Chemical Fertilizer Plant and the Bac Giang Chemical Fertilizer Plant. The three JCS industrial targets not yet struck are the Viet Tri Chemical Plant, the Hanoi Machine Tool Plant and the Haiphong Phosphate Fertilizer Plant. All of the bombed targets are inoperative due to direct bomb damage and lack of electric power. Of the unbombed targets, Viet Tri is completely inoperative because of a shortage of power, the Haiphong Phosphate Fertilizer Plant has been relocated, and the Hanoi Machine Tool Plant is estimated to be 75 percent inoperative through power shortages.

15. North Vietnam's industry produced little in the way of war-related materials and the loss of industrial capacity has had little significant effect on the North's ability to support the war in the South. The industrial plant that makes the most significant contribution to the war effort is the Hanoi Machine Tool Plant, which has manufactured machine tools, vehicle parts, diesel engines, and rail cars. To a large degree, however, the regime has reduced the importance of this plant by dispersing some of its facilities to rural areas. Other small machine-building and metal-working facilities have also been scattered throughout the rural areas and play an important role in the repair of machinery and transport equipment of all types.

16. Some additional miscellaneous industrial facilities have been damaged by airstrikes and many more have been rendered inoperative by lack of power. The complete destruction of these facilities would yield only minor additional adverse effects on the economy and on the war effort. A number of small-scale facilities and handicraft establishments contribute indirectly to the war effort but do not lend themselves readily to targeting.

Agricultural Production

17. During the seven years immediately preceding the bombing, North Vietnam's annual rice harvest averaged about 4.5 million metric tons. The 1966 rice crop was approximately 4.2 million tons, a drop of 300,000 tons of paddy, or about 200,000 tons of polished rice. The decline resulted in part from a drought in September, the month that usually has the heaviest rainfall, followed by late rains and flooding in some areas, and also from the disruption of transportation and diversion of manpower caused by the bombing. It is estimated that the 1967 spring rice harvest, which accounts for about one-third of the annual rice harvest, was about 200,000 tons of paddy (about 130,000 tons of polished rice) below average. The decline was due to a reduction in rice acreage, abnormally cold weather, and to the disruption of transportation and the diversion of manpower caused by the war.

18. Agricultural production is dependent on so many variables that it is difficult to separate out the effects due to changes in each one. However, it is unlikely that the current shortfall was due primarily to the diversion of manpower. Even in the 7 years before the bombing, North Vietnam's individual harvests varied from a high of 5.2 million tons in 1959 to a low of 4.2 million tons in 1960. In two years, 1960 and 1963, the rice harvest dropped to the level of the 1966 harvest without any manpower diversions caused by bombing. In addition, in 1965, the year in which manpower diversion began, the rice harvest was an average one of 4.5 million tons. In view of these facts it is likely that little of the shortfall in 1966 and the first half of 1967 was due to manpower diversions.

19. It is possible for North Vietnam to compensate for a considerable reduction in agricultural labor by the increased use of fertilizer and equipment. The amount of fertilizer and equipment used per acre is well below the amounts used in western countries. Rice yields in North Vietnam, although higher than many other southeast Asia countries, are still well below the yields that can be obtained with greater use of fertilizer. Increased yields would save on manpower by permitting a reduction in the area to be plowed, weeded and harvested. However the importation, distribution and application of fertilizer itself necessitates the use of manpower and adds a burden to transportation facilities. The increased use of equipment, such as tractors, trucks, irrigation pumps and harvesting machinery would undoubtedly decrease the labor requirement per unit of rice produced. The fact that imports of labor saving agricultural machinery have not noticeably increased since the bombing tends to confirm the estimate that manpower is not a limiting factor in agricultural production.

20. The current grain deficit has resulted in a sizeable increase in food imports. In all of 1966 food imports amounted to about 80,000 tons, while during the first nine months of 1967 food imports, primarily flour, rice, maize and sugar, have amounted to about 320,000 tons and for the whole of 1967 will probably amount to 400,000 tons.

21. The estimated shortfall of polished rice in 1966 (200,000 tons) and the first half of 1967 (130,000 tons) about equals the 320,000 tons of food imported during the same time period. Imports during the second half of 1967 probably represent an attempt to stockpile in anticipation of a shortfall in the rice crop which is harvested in November and contributes about two-thirds of the annual crop. If food imports continue in the fourth quarter at the same rate as the third quarter of this year North Vietnam would be in a position to cope with a shortfall in the Autumn harvest of about 250,000 tons of paddy.

Communist Trade and Aid Programs

22. Since the bombing began, Communist trade and aid programs with North Vietnam have changed in a number of respects. The amount of aid received by North Vietnam has increased substantially over pre-bombing years as reflected in increased imports and declining exports. The type of economic aid has changed from assistance in developing modern industry to constructing widely scattered small plants and to supplying large volumes of transport equipment. The USSR and Eastern European countries have assumed a greater relative share of the total economic aid to North Vietnam, with the USSR surpassing Communist China as North Vietnam's major donor. A greater portion of the aid extended is "non-refundable" grant aid, apparently in deference to North Vietnam's obvious inability to repay. Finally, a greater portion of total aid is now military aid resulting from vastly increased requirements for air defense and a greater involvement in the war in South Vietnam.

23. As a result of declining food production, declining output in some industries, and greatly increased demands of the war, North Vietnam has become increasingly dependent on assistance from Communist countries. Trade deficits have increased regularly as imports grew and exports fell off. In 1964, the trade deficit amounted to about $25 million with exports valued at about $100 million. In 1965, the deficit shot up to about $90 million due entirely to increased imports. In 1966, the deficit was over $150 million with exports off 20 percent. It is estimated that exports in 1967 may be below $70 million and imports thus far have been increased, so the trade deficit in 1967 may go to $200 million. The following tabulation shows the value of total imports and exports in million of US dollars for the years 1963-66:

	1963	1964	1965	1966
Total Trade	248	239	298	323
Imports (Excluding Grant Aid)	147	131	195	241
Exports	101	108	103	82

24. Almost half of North Vietnam's exports by value are products of agriculture, forestry, fishing, and handicrafts. Agricultural products exported include processed fruits and canned poultry products. In addition, metals, minerals and building materials are exported. However, by mid-1967 important exports of apatite, coal, cement, and pig iron had been drastically curtailed as a result of bomb damage to the modern industrial sector.

25. The country imports all of its petroleum, finished steel, railroad rolling stock, vehicles, and most of the machinery and metal manufactures, spare parts, industrial chemicals, and raw cotton. Imports of most of these products have been increased since 1965. There have been sharp increases in imports of machinery and equipment related to the repair and replacement of parts in the transportation and power sectors of the economy, and to the repair and reconstruction programs; such imports include vehicles for road, rail, and water transport, roadbuilding equipment, machine tools, small diesel generators and spare parts. The following tabulation shows the volume of identified seaborne imports, 1964 through September 1967, in thousands of metric tons:

	1964	1965	1966	Jan-Sept 1967
Total	638	697	932	1,022
Ammonium Sulfate and other fertilizers	140	162	224	134
Petroleum	142	170	201	185
Grain and other foods	162	119	77	319
Timber	32	15	14	13
Miscellaneous	162	231	416	371

26. Before the bombing, economic aid projects included a number of large modern industrial facilities. However, project aid since 1965

has emphasized the construction of small light industrial plants, small electric power installations and machine shops. Some economic aid projects since 1965 have contributed directly to the war, particularly those pertaining to truck repair,, machine shops, and pier construction. Although most of the construction activity on large aid projects has been suspended, work on small irrigation pumping stations, state-farm projects, and mining assistance has been continued.

27. Almost $1 billion in economic grants and credits were extended during the years from 1955 through 1964. Of this total, Communist China contributed almost half, the USSR about 40 percent, and the East European countries the remainder. About 40 percent of all economic aid through 1964 was in the form of grants, and the remainder was in the form of credits with low interest rates and easy repayment terms. From an average annual aid of about $100 million through 1964, economic aid increased as follows; in millions of US dollars:

	(Million US $)			
	1965	1966	Jan-Jun 1967	Total 1965 to June 1967
Economic Aid	150	275	170	595
USSR	85	150	100	335
Communist China	50	75	40	165
Eastern Europe	15	50	30	95

During August through October, 1967, new economic aid agreements were signed with all Communist countries. Although the value of aid for 1968 was not indicated in these agreements, it is apparent that North Vietnam's economic requirements will be met. The new aid agreements made references to grant aid, to the extension of credits and to deferred payments. It is not possible, however, to estimate how much of economic aid since 1965 has been in the form of grants. However, because of the declining value of exports, the majority of present aid extensions will not be dependent on immediate capacity to meet repayment terms.

28. The USSR and China have greatly expanded military assistance to North Vietnam since 1965. Deliveries of military materials, which previously had been on a relatively small scale, reached an estimated

$270 million* in 1965, $455 million in 1966, and appear to be continuing at an even higher annual rate in 1967, as shown in the following tabulation, in millions of US dollars:

	1965	1966	Jan-Jun 1967	1965 June 1967
Military Aid	270	455	330	1,055
USSR	210	360	260	830
Communist China	60	95	70	225

29. The military aid programs have followed well-established lines, in part reflecting the capabilities of the donors. The USSR has provided the bulk of more advanced weapons systems such as surface-to-air missiles, antiaircraft guns, radar, tanks, artillery and fighter aircraft. The Chinese have been the major suppliers of small arms and ground forces equipment, as well as military manpower for logistics and construction activities and antiaircraft defense. Hungary, Poland, and Bulgaria have indicated that they will supply military aid to North Vietnam in 1968, the exact nature not being specified. Military aid includes both equipment that is currently being used and produced by the Soviet and Chinese military forces, and older equipment. There are no clear indications that the rate of equipment deliveries in any way is a burden on either of the principal donors.

30. Although economic and military aid to North Vietnam, in value, represent an insignificant portion of gross national product or of estimated defense budgets of the Communist countries, this aid, when compared with Communist aid programs for all other countries is of significant proportions. Soviet military aid to North Vietnam during the first half of 1967 represented an estimated 50 percent of total Soviet military aid deliveries. Communist Chinese military aid to North Vietnam in the first half of 1967 represented an estimated 90 percent of total Chinese military aid deliveries. The USSR sent to North Vietnam during the first half of 1967 about 25 percent of its total economic aid deliveries. Communist China sent to North Vietnam during the first half of 1967 about 30 to 40 percent of its total economic aid deliveries. The European Communist countries, with a considerably smaller total economic aid program, sent to North Vietnam during the first half of 1967 an estimated 40-50 percent of their total economic aid deliveries.

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* Values are based on Soviet foreign trade prices (prices charged for similar equipment sold to less developed countries) that are believed to most closely approximate the true value of this equipment.